Publishing scientific papers
Why, how, and making an impact

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Outline

We all (want to) publish scientific papers . . .

1. Why publish?

2. Getting your paper published

3. Writing your paper

4. Getting your paper read and cited → **making an impact on science or society**

European Journal of Soil Science

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Change from paddy rice to vegetable growing changes nitrogen-cycling microbial communities and their variation with depth in the soil

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Summary

Changes in land use are likely to affect the abundance and functioning of microorganisms in the soil. In China many paddy fields are being converted for vegetable growing. We wished to determine how these changes affected the microbial populations in one particular region in Hunan province, where the climate is subtropical monsoon, as an example. We sampled the soil down to 1 m in several fields: three that were still growing paddy rice, three that had been converted for vegetable growing 2 years earlier and three that had been growing vegetables for 25 years. Quantitative polymerase chain reaction (qPCR) and terminal-restriction fragment length polymorphism (T-RFLP) were used to determine the abundance and community composition of *nxrA*-containing nitrifiers and *narG*-containing denitrifiers in the soil. The abundances of these organisms depended largely on the amount of organic matter in the soil and decreased with increasing depth, as did the potential nitrification rate (PNR) and nitrate reductase activity (NRA). Enzyme activity was significantly correlated with the abundance of nitrogen-cycling bacteria. The change from rice to vegetable growing resulted in more residual nitrate-N in the soil, which correlated more strongly with the abundance of *nxrA*-containing nitrifiers in the topsoil (0–20 cm) and *narG*-containing denitrifiers in the deeper soil (80–100 cm). In general, the numbers of nitrogen-cycling microorganisms decreased markedly with increasing depth, but were less affected by the change from rice to vegetable cultivation in the fields investigated. Our results suggest that the abundances of nitrogen-cycling microbial communities are affected more by depth in the soil than by change of land use in these circumstances.

Highlights

- The abundance and function of soil microorganisms change when paddy fields are converted to vegetable growing.
- Residual nitrate-N in the soil is affected by nitrifiers in topsoil and denitrifiers in the deeper soil.
- Their abundances depend largely on the amount of organic matter in soil and decrease with increasing depth.
- The genetic structures of the microorganisms depend more on depth in the soil than on change from rice to vegetable growing.

Introduction

To meet the increasing demand for vegetables in expanding Asian cities, many paddy fields are being converted for vegetable cultivation, especially in China, Korea and Japan (Darilek *et al.*, 2010). These changes in land use and the changes in the way the land is fertilized and manured change the soil's pH, its moisture and temperature regimes, the availability of plant nutrients and the amount and composition of the organic matter in the soil (Qin *et al.*, 2013). These in turn are likely to affect the microbial communities in the soil. Such effects have been studied, but only shortly after the changes were implemented. With long-term vegetable growing and

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LETTERS

Carbon losses from all soils across England and Wales 1978–2003

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More than twice as much carbon is held in soils as in vegetation or the atmosphere[1], and changes in soil carbon content can have a large effect on the global carbon budget. The possibility that climate change is being reinforced by increased carbon dioxide emissions from soils owing to rising temperature is the subject of a continuing debate[2–9]. But evidence for the suggested feedback mechanism has to date come solely from small-scale laboratory and field experiments and modelling studies[2–9]. Here we use data from the National Soil Inventory of England and Wales obtained between 1978 and 2003 to show that carbon was lost from soils across England and Wales over the survey period at a mean rate of 0.6% yr^{-1} (relative to the existing soil carbon content). We find that the relative rate of carbon loss increased with soil carbon content and was more than 2% yr^{-1} in soils with carbon contents greater than 100 g kg^{-1}. The relationship between rate of carbon loss and carbon content is irrespective of land use, suggesting a link to climate change. Our findings indicate that losses of soil carbon in England and Wales—and by inference in other temperate regions—are likely to have been offsetting absorption of carbon by terrestrial sinks.

The National Soil Inventory was made to obtain an unbiased estimate of the distribution of the soils of England and Wales and of the chemistry of the topsoil (0–15 cm depth)[10]. Samples were collected and soil profiles described at the intersections of an orthogonal 5-km grid over the whole area (Methods). This yielded about 6,000 sites, of which 5,662 could be sampled for soil. Figure 1a shows the distribution of soil organic carbon contents across England and Wales measured in the original sampling (1978–83). Sufficient subsets of the sites were resampled at intervals from 12 to 25 yr after the original sampling to be able to detect changes in carbon content with 95% confidence (Methods). This was done in three phases: in 1994–95 for arable and rotational grassland sites (853 of the original 2,578 sites), in 1995–96 for managed permanent grassland sites (771 of the original 1,579), and in 2003 for non-agricultural sites (bogs, scrub, rough grazing, woodland, and so on; 555 of the original 1,505). Roughly 40% of the original sites were resampled. This is the only soil inventory on such a scale anywhere in the world to have been resampled. To allow for the varying time interval between samplings, annual rates of change in carbon were calculated for each site by assuming that the process of change was linear over the sampling interval. An analysis of known rates of change in soil carbon under different conditions showed this to be reasonable.

Figure 2 summarizes the results grouped by soil type and land use. Some differences between soils and land uses are apparent: for example, peat soils lost carbon an order of magnitude faster than brown soils and man-made soils, and bogs and upland grass lost carbon an order of magnitude faster than lowland heath, which appears to have gained carbon on average. But we found no statistically significant relations between rate of change and land use, rainfall class or soil textural class, whether for the data as a whole or for outlying data. However, we found a significant negative linear correlation between rate of change and original organic carbon

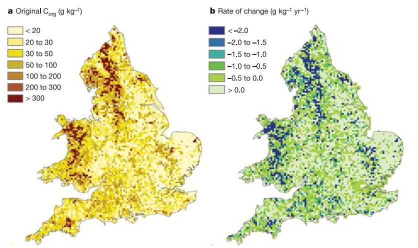

Figure 1 | Changes in soil organic carbon contents across England and Wales between 1978 and 2003. a, Carbon contents in the original samplings, and **b,** rates of change calculated from the changes over the different sampling intervals. Values at sites that were not resampled were calculated from their original organic carbon contents using equation (1). The changes were negative in all but 8% of the sites.

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Minimum Data Set for Assessing Soil Quality in Farmland of Northeast China*1

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ABSTRACT

Soil quality assessment provides a tool for agriculture managers and policy makers to gain a better understanding of how various agricultural systems affect soil resources. Soil quality of Hailun County, a typical soybean (*Glycine max* L. Merill) growing area located in Northeast China, was evaluated using soil quality index (SQI) methods. Each SQI was computed using a minimum data set (MDS) selected using principal components analysis (PCA) as a data reduction technique. Eight MDS indicators were selected from 20 physical and chemical soil measurements. The MDS accounted for 74.9% of the total variance in the total data set (TDS). The SQI values for 88 soil samples were evaluated with linear scoring techniques and various weight methods. The results showed that SQI values correlated well with soybean yield ($r = 0.658^{**}$) when indicators in MDS were weighted by the regression coefficient computed for each yield and index. Stepwise regression between yield and principal components (PCs) indicated that available boron (AvB), available phosphorus (AvP), available potassium (AvK), available iron (AvFe) and texture were the main factors limiting soybean yield. The method used to select an MDS could not only appropriately assess soil quality but also be used as a powerful tool for soil nutrient diagnosis at the regional level.

Key Words: norm value, principal component analysis, soil quality index, stepwise regression

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INTRODUCTION

Soil is a natural resource essential for the existence of life on our planet. It provides services involving complex interactions among its biological, physical, and chemical properties (Karlen *et al.*, 1997). Soil quality is defined as the capacity of soil to function within ecosystem boundaries to sustain biological productivity, maintain environmental quality and promote plant and animal health (Doran and Parkin, 1994). Soil quality assessment is best viewed as an integrative process of sustainable land management when used to evaluate environmental quality, food security, and economic issues (Larson and Pierce, 1994; Hussain *et al.*, 1999). Soil assessment and monitoring rely on indicators that can integrate biological, chemical and physical attributes. Numerous soil quality evaluation methods have been developed since the USDA Soil Conservation Service released its land capability classification system in 1961 (Klingebiel and Montgomery, 1961). These methods include soil quality cards and test kits (Ditzler and Tugel, 2002), soil quality index (SQI) methods (Doran and Parkin, 1994; Andrews *et al.*, 2002a), fuzzy association rules (Xue *et al.*, 2010), dynamic soil quality models (Larson and Pierce, 1994), and the soil management assessment framework (Andrews *et al.*, 2004; Masto *et al.*, 2007; Karlen *et al.*, 2008; Wienhold *et al.*, 2009). Among these methods, the SQI approach is perhaps the most common (Andrews *et al.*, 2002a) because of its simplicity and quantitative flexibility.

Soil quality indices are tools for adaptive soil resource management that can help farmers and their advisors determine soil health trends and thereby indicate whether one or more changes in practice are necessary (Karlen *et al.*, 2001). Therefore, a universa-

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Topic: Why publish?

Practical reasons:

- It is a **requirement** to graduate
- It is a **requirement** to get a (first, better) position
- It is a **requirement** of the position
- It helps get **projects**: funding agencies look at the publication list
- . . . But **is there a deeper reason?**

In other other words, **why has publishing become a requirement?**

The scientific enterprise

Why do we do science?

- An attempt to discover the **true state of “nature”** including “society”
- An attempt to discover the **reasons** for what we observe → theories, “laws”
- These require **methods** of
  - investigation (data collection, sampling, processing . . .) and
  - analysis (inferential statistics, process models . . .)

  so we have to develop appropriate methods

How does science advance?

- Scientific knowledge is **incremental** (advances in small steps) 递增
  - it is rarely **revolutionary**: a new paradigm 新的范式
- Scientific knowledge is **self-correcting** 自动校正的 because of replication 重复, new data, new methods, new studies . . .
- But these depend on a **chain of knowledge** which is **documented** and **accessible** 易获得的.
- The **scientific paper** 科学论文 is the main method to **document scientific progress**.

The place of the research paper in the scientific enterprise

- Original **research** papers
  - A record of what was **seen** (data collection) and **inferred** (data analysis)
  - A record of the **theories** developed to explain (part of) “nature”/“society”
  - A documentation of **methods** and their relative success in different contexts
  - A record of who did what — **scientific credit**
    - This is the reason why publishing papers is a requirement – it shows who produced new scientific knowledge
    - Your papers are your **scientific reputation** 科学名声

- **Review** papers
  - an **overview and synthesis** of what has been done, what has been most successful, and what remains to be done
  - Sometimes the synthesis supports new or revised **theories**

Research paper

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Optimized multi-phase sampling for soil remediation surveys

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ABSTRACT

We develop an algorithm for optimizing the design of multi-phase soil remediation surveys. The locations of observations in later phases are selected to minimize the expected loss incurred from misclassification of the local contamination status of the soil. Unlike in existing multi-phase design methods, the location of multiple observations can be optimized simultaneously and the reduction in the expected loss can be forecast. Hence rational decisions can be made regarding the resources which should be allocated to further sampling. The geostatistical analysis uses a copula-based spatial model which can represent general types of variation including distributions which include extreme values. The algorithm is used to design a hypothetical second phase of a survey of soil lead contamination in Glebe, Sydney. Observations for this phase are generally dispersed on the boundaries between areas which, according to the first phase, either require or do not require remediation. The algorithm is initially used to make remediation decisions at the point scale, but we demonstrate how it can be used to inform over blocks.

1. Introduction

Human-health and environmental concerns require the remediation of contaminated soils near former industrial sites throughout the world. In many cases, thresholds have been defined for

Abbreviations: AIC, Akaike information criterion; AEIL, Australian Environmental Investigation Limit; EBLUP, empirical best linear unbiased predictor; ML, maximum likelihood; pdf, probability density function; SSA, spatial simulated annealing.

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Pedology

Mapping Soil Health over Large Agriculturally Important Areas

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Soil health deterioration due to intensive agricultural activity is a worldwide problem. To better understand this process, there is a prime need to map soil health over wide areas. This paper aims to quantify soil health in a spatially explicit manner over a large area using soil health indicators. The methodology includes sampling design, autocorrelation analysis and Kriging interpolation. The following variables were measured from vertisol clayey soils: aggregate stability (AS); available water capacity (AWC); surface and subsurface penetration resistance (PR15 and PR45 respectively); root health (RH); organic matter (OM); pH; electrical conductivity (EC); cation-exchange capacity (CEC); exchangeable K; nitrification potential (Np); and P. Stratified random sampling was found to be a more efficient method than random sampling for representing a large area with a limited number of sampling locations. The variogram envelope method was found to be more conservative in determining the significance of autocorrelation than the classical Moran's I approach. Phosphorus, CEC, PR15, EC, and K exhibited strong autocorrelation in space; other variables showed no autocorrelation. Land management factors were found to control the spatial variability of most soil variables. Kriging with an external drift (KED) was found to be the most useful approach for spatial prediction of soil health. A positive correlation was found between the interpolated soil health index and NDVI (Normalized Difference Vegetation Index). These results suggest that soil health maps can be used to explore how cultivation activities limit crop yields at the catchment scale, and to determine whether these activities create distinctive soil characteristics.

Abbreviations: AS, aggregate stability; AWC, available water capacity; CEC, cation-exchange capacity; CND, cumulative normal distribution; CSHI, Composite Soil Health Index; DEM, digital elevation model; DT, disk tillage; EC, electrical conductivity; GIS, geographic information system; KED, Kriging with an external drift; NDVI, Normalized Difference Vegetation Index; Np, nitrification potential; NT, no-tillage; OM, organic matter; PR, penetration resistance; PR15, surface penetration resistance; PR45, subsurface penetration resistance; PT, plowing; RH, root health.

Soil quality is the capacity of a soil to sustain biological productivity, maintain environmental quality, and promote plant and animal health, within ecosystem boundaries (Karlen et al., 1997; Doran and Parkin, 1994). Worldwide assessments have shown that soil quality and crop yield often decline due to intensive agricultural activity (Bakker et al., 2007; Horn, 2009; Svoray and Bensaid 2010).

The concept of soil health developed from the term "soil quality" that was extant in the 1990s. A frequently cited definition of soil health comes from Doran et al. (1996):

> '[soil health is] the continued capacity of soil to function as a vital living system, within ecosystem and land-use boundaries, to sustain biological productivity, maintain the quality of air and water environments, and promote plant, animal, and human health'.

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Review paper

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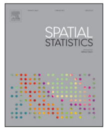

A review of spatial sampling

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ABSTRACT

The main aim of spatial sampling is to collect samples in 1-, 2- or 3-dimensional space. It is typically used to estimate the total or mean for a parameter in an area, to optimize parameter estimations for unsampled locations, or to predict the location of a movable object. Some objectives are for populations, representing the "here and now", whereas other objectives concern superpopulations that generate the populations. Data to be collected are usually spatially autocorrelated and heterogeneous, whereas sampling is usually not repeatable. In various senses it is distinct from the assumption of independent and identically distributed (i.i.d.) data from a population in conventional sampling. The uncertainty for spatial sample estimation propagates along a chain from spatial variation in the stochastic field to sample distribution and statistical tools used to obtain an estimate. This uncertainty is measured using either a design-based or model-based method. Both methods can be used in population and superpopulation studies. An unbiased estimate with the lowest variance is thus a common goal in spatial sampling and inference. Reaching this objective can be addressed by sample allocation in an area to obtain a restricted objective function.

Contents

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Topic: Getting your paper published

Before thinking about publishing. . . **do novel, correct and interesting science**!!

- Something that **advances the scientific enterprise**
- Something with (possibly indirect) **relevance to societal problems**
- Something that **other scientists will want to know about**

Is your work new?

- Do a thorough **literature search**
  - Use reliable databases: **Web of Science** (*all SCI papers*), Elsevier Science Direct, Scopus
  - Develop a systematic **search strategy**: concept groups, keywords, Boolean operators, truncation . . .
- Make sure the search is **up-to-date**
  - Sign up for (free) **content alerts** based on your searches
  - When you find a relevant paper:
    - look through its reference list ("**backward** spider")
    - search for papers that cite this paper ("**forward** spider")
  - Look for other work by the same authors
- Summarize what is **known** (solved) and what is **not** (remains to be solved)

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How to select a journal – practical considerations

- It must be on an **approved list**, *if that is required for your job*
  - These are *not* the only good journal, or the most appropriate for your work!
  - **New** journals do not enter the list for several years, even if of **high quality**
- It should be in the **highest-impact factor** group (SCI 区), *if that is required for your job*
- It should have a strong **editorial board** so the reviews will be high-quality (→ improve the paper, **avoid mistakes** that will damage your **reputation**)
- It should have an **easy submission process** and **quick review**
- (*It helps to have friendly editors who know you or your senior colleague*)

Approved list

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Journals 1-10 (of 24)

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How to select a journal – scientific considerations

- **Audience**: who reads it?
  - Would they find your paper interesting? Would they want to read it?
- **Reputation**: is it considered reliable and of high quality?
  - other scientists tend to keep up with the most reputable journals → more likely to find your paper
  - the ranking by SCI 区 has some relevance; although that is based on an imperfect measure, the “impact factor”
  - the reputation of the members of the editorial board
- **Scope**: does it include papers **similar to yours**?
  - This increases the chances of a **good review** and **reaching your target audience**

Submitting to the journal

1. *Carefully* read the journal's **Instructions for Authors** and prepare your paper *exactly* according to their guidelines
   - reference and citation format, length of paper, highlights, abstract, tables & figures . . .

2. Add a polite **cover letter** explaining why your paper would be appropriate for *that* journal.

3. Only submit the paper (or slight modifications of it) to *one* journal!
   - All journals require exclusive submissions; if rejected you can then submit elsewhere.

4. The paper as you submit it should be **as good as you can make it** – you would be satisfied if it would be published as-is, without any changes
   - Do *not* submit a half-cooked paper and expect the reviewers to improve it!

Getting through the review process

- Carefully follow the **journal guidelines** and **submission procedure**
- **Prepare** your paper well, **check** carefully before submission
  - Is your argument as strong as you can make it?
  - Is the paper clear and to the point?
  - Double-checked for grammer/typographic/spelling errors
  - All citations correct? all references properly formatted according to the journal's requirements and correct?
    - **Check each reference against the original** – do not trust a reference list in another paper
- Careless 毛手毛脚, sloppy 偷工减料 submissions give a bad impression to the reviewer
  - If you can't be bothered to take care with your paper, how can we trust that you take care with your science?

Main frustrations for reviewers

These are sure to lead to a bad review, even rejection, and are really an abuse of the reviewer's time 滥用审阅者的时间:

- Not following the journal guidelines
- Careless with grammar, typos, references
- Not clearly stating the research problem, questions and objectives
  - Why was this work done? Why is it important? What can we do with the results? What do we know now that we didn't before?
- Not placing the work in context of previous work
- Not relating the results to the research questions in a Discussion

Carefully follow the journal guidelines!

Source: http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1365-2389/homepage/ForAuthors.html

Some guidelines have been translated

PLOS | ONE   Publish   About   Browse   Search
advanced search

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(PLOS Editorial and Publishing Policies)

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This page was last modified in October 2014

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PLOS出版的所有期刊均为自主出版物。

PLOS Biology和***PLOS Medicine***。这两本期刊均配有专业编辑和学术编辑团队、负责评估待出版的论文。如果向PLOS Biology或PLOS Medicine投递稿件的内容介于基础研究与临床研究之间、这两本期刊的专业编辑会就投稿内容进行讨论、确保尽可能公正地对待稿件、根据讨论结果、编辑可能会建议原本向PLOS Medicine投稿的作者将稿件转投PLOS Biology（反之亦然）。

PLOS专刊。*PLOS Computational Biology*、*PLOS Genetics*、*PLOS Pathogens*和*PLOS Neglected Tropical Diseases*均由各自的主编和社区编辑部负责、且独立运行。

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2. 出版费

Source: http://journals.plos.org/plosone/s/editorial-and-publishing-policies-chinese

The use of statistics must be correct!

European Journal of Soil Science

Edited By: M. Oliver
Impact Factor: 2.649
ISI Journal Citation Reports © Ranking: 2014: 7/34 (Soil Science)
Online ISSN: 1365-2389
Associated Title(s): Soil Use and Management

Author Guidelines

- Guidance to authors: see below
- ScholarOne Manuscripts
- Style file
- Sample article
- Supporting Information
- Proof correction marks
- Electronic artwork instructions
- Guidance on statistics
- Instructions for using LaTeX: LaTeX version; PDF version
- English Language Editing

2. Exploratory data analysis for surveys

Exploratory data analysis is essential as a guide to further decisions on data transformation and analysis, and should be reported and illustrated.

Exploratory data analysis for surveys	
Have you provided summary statistics (**2.1**)?	Compute statistics Tabulate statistics (see **Table 1**)
Do the data have a near-normal distribution?	Check by: computing and plotting histograms (**Figure 1**) or boxplots, examining skewness coefficient (**Table 1**)
Do you need to transform data (**2.2**)?	If skewness is outside the range [−1,1] and relates to a long positive or negative tail: use a suitable transformation (**Figure 1a**), For example transform to logarithms for large positive skews (**2.2.1**) (**Table 1** and **Figure 1b**)
Are outliers present in the data?	Examine histogram for outliers (**Figure 1c**) If skewness is due entirely to outliers, then transformation is not appropriate: **Figure 1d** and go to Barnett & Lewis (1994) for options on what to do

The review process

1. Your paper will be checked by the **journal editor**
   (a) Does its topic fit within the journal?
   (b) Is the paper properly formatted?
   (c) Is the paper of sufficient importance? Does it repeat work published elsewhere? Is it plagiarized 论文抄袭?

2. The editor sends to 2–5 expert **reviewers**; they read the paper and **advise** the editor
   - accept, minor revision, major revision, reject but resubmit, reject completely

3. The **editor** decides, and writes a letter explaining the decision.

Responding to reviewers and the editor

- **Do not dispute the editor's decision**
- If revision, **carefully consider the reviewer's objections** and fix the paper
- Write a point-by-point **response to reviewers**, and if the editor had other comments, another to the editor
  - You can disagree with the reviewer, and explain in the response. However in general you also adjust the paper to avoid the mis-understanding.
- **Resubmit** according to instructions

Topic: Writing the paper

1. Types of papers
2. Positioning your paper for the target journal and audience
3. **Writing an exciting paper that people will want to read and use**
4. Scientific English
5. The writing process

Types of papers

What is the main focus of your paper? One or more of these:

- Developing a **new method** to attack a **known problem**
- Solving a **practical problem**, using existing methods in a clever and apropriate way
- Using a **new data source** to solve a problem, comparing to solutions using previously-available dataset
- Developing a **new theory** to explain observations
- **Reviewing and summarizing** progress in a field up to now and suggesting ways forward

What is the objective of your paper?

If you can answer these questions clearly, you have a good idea of (1) the **target journal**, (2) the way you want to **tell your story**.

1. What is your research trying to **accomplish**?
2. How is it done **currently**? What is **missing** or could be done **better**?
3. What's **new** in your research, compared to previous work?
4. **Who should care?** I.e., who should use the results of your research?

Example – developing a tool to help regulators

Lark, R. M., & Knights, K. V. (2015). "The implicit loss function for errors in soil information". *Geoderma*, 251–252, 24–32[1]

Who cares?

- *In many countries today there are critically important* ***decisions*** *to be made . . .*
- . . . *in* ***environmental policy and regulation****.*
- *We developed an* ***additional tool*** *. . .*
- *to help us support* ***policy and regulatory customers*** *to make sound decisions on* ***data collection****.*

[1] http://doi.org/10.1016/j.geoderma.2015.03.014

Example – understanding a transportation system

Wei, S., Xu, J., Sun, J., Yang, X., Xin, R., Shen, D., . . . Xu, C. (2018). "Open big data from ticketing website as a useful tool for characterizing spatial features of the Chinese high-speed rail system". *Journal of Spatial Science*, 63(2), 265–277[2]

- *China now has the largest high-speed rail system in the world.*
- *However, due to **data limitations**, **understanding of this system remains incomplete**.*
- *Here we combined **open big data**, complex **network indicators** and **spatial analyses** . . .*
- *. . . to reveal the hierarchical and modular **structure** of the system.*

[2] https://doi.org/10.1080/14498596.2018.1497561

Write for your audience

Write for the **target audience**, *not* for yourself or your supervisor or your co-authors. *Imagine* someone you know in that audience reading it, as you write.

- **technical level** (what do they know? what needs to be explained?)
  - example: describing a method of spatial interpolation in *Spatial Statistics* vs. *Natural Hazards* – do the kriging formulas need to be included, do they need to be explained, do they need to be justified?
- knowledge of the **specialized vocabulary** you use
  - example: writing a paper on how structural geology controls earthquake hazard for a geophysics journal, vs. for an urban planning journal
- knowledge of the **previous literature** on the subject

Writing an interesting and exciting scientific paper

1. Begin with the **problem** you were trying to solve – **what was missing, what did you decide to do?** Then a longer **literature review of previous work**

2. ‘Materials and methods’ should be as short as possible, but give **enough information for others to repeat the work.**

3. The ‘Results and Discussion’ show **what happened** after applying the methods (*results*), and what you think this **implies** (*discussion*)

   - Emphasize the degree to which the objectives were met, in the context.
   - Is the result as expected? disappointing? a large improvement?
   - How does this compare with other work on the same problem?

4. Conclusions and recommendations – **talk directly to the reader**!

   - What is solved, what remains to be solved?
   - What should be the next steps?

Do not plagiarize

Plagiarism 论文抄袭: Representing the work of others as one’s own

Several forms:

1. **Copying** someone else’s work;
2. **Paraphrasing** someone else’s work, i.e. saying the same thing with slightly different words and phrasing;
3. **Reporting** someone else’s work (e.g. fieldwork) as if it were your own.

Plagiarism is easy to *detect*; most publishers check automatically

If you plagiarize and are dected, the paper will be rejected and you will likely be banned from all the journals of the published

Avoiding plagiarism

- It is almost impossible to copy if you **write the text yourself**, there will be enough variation so that it's clear that it was independently written.

- **Summarize in your own words** – then you know you really **understand** what you are saying.

- Do *not* copy-and-paste and then plan to "adapt"

- If you want to copy-and-paste, do it in *another document*, for reference.

- **Quote** when you really need to use the text, e.g. to discuss another author's statement, to repeat an exact definition to be discussed. Example:

  A modern consensus definition of ***soil health*** *is* ***"****the continued capacity of the soil to function as a vital living ecosystem that sustains plants, animals and humans****"*** *(Natural Resources Conservation Service, 2012).*

Scientific English

- Write **short sentences** and connect them with either a logical sequence or connecting words.
  - Chinese style is for **long sentences** with many nested subordinate clauses – difficult to write in a foreign language. Example:

    '*The samples, which had been collected in two visits were arranged by local collaborators, were immediately frozen and then transported to the central lab, where they were analyzed, according to standard protocols, in order to determine the concentrations of different forms of N*'.
  - This is correct English grammar but (1) difficult to write correctly, (2) difficult for the reader. Break this into three **short sentences**:

    '*Local collaborators arranged two visits.*

    'Samples were immediately frozen and then transported to the central lab.

    'They were analyzed according to standard protocols to determine the concentrations of different forms of N.'

Scientific English – 2

Omit needless words

- Not like this:

  '*The results show that after computing the correlation matrix between the NIR and IR bands* the correlation was found to be 0.95 for the LANDSAT TM7 images and 0.96 for the ASTER images.'

  '*As a result of the field measurements, it could be observed that* the average steady-state infiltration rate of the soils was 1.2 cm hr^{-1}'

- But like this:

  '*The NIR and IR bands were highly correlated (LANDSAT TM7 $r = 0.95$, ASTER $r = 0.96$).*'

  'The average steady-state infiltration rate was 1.2 cm hr^{-1}.'

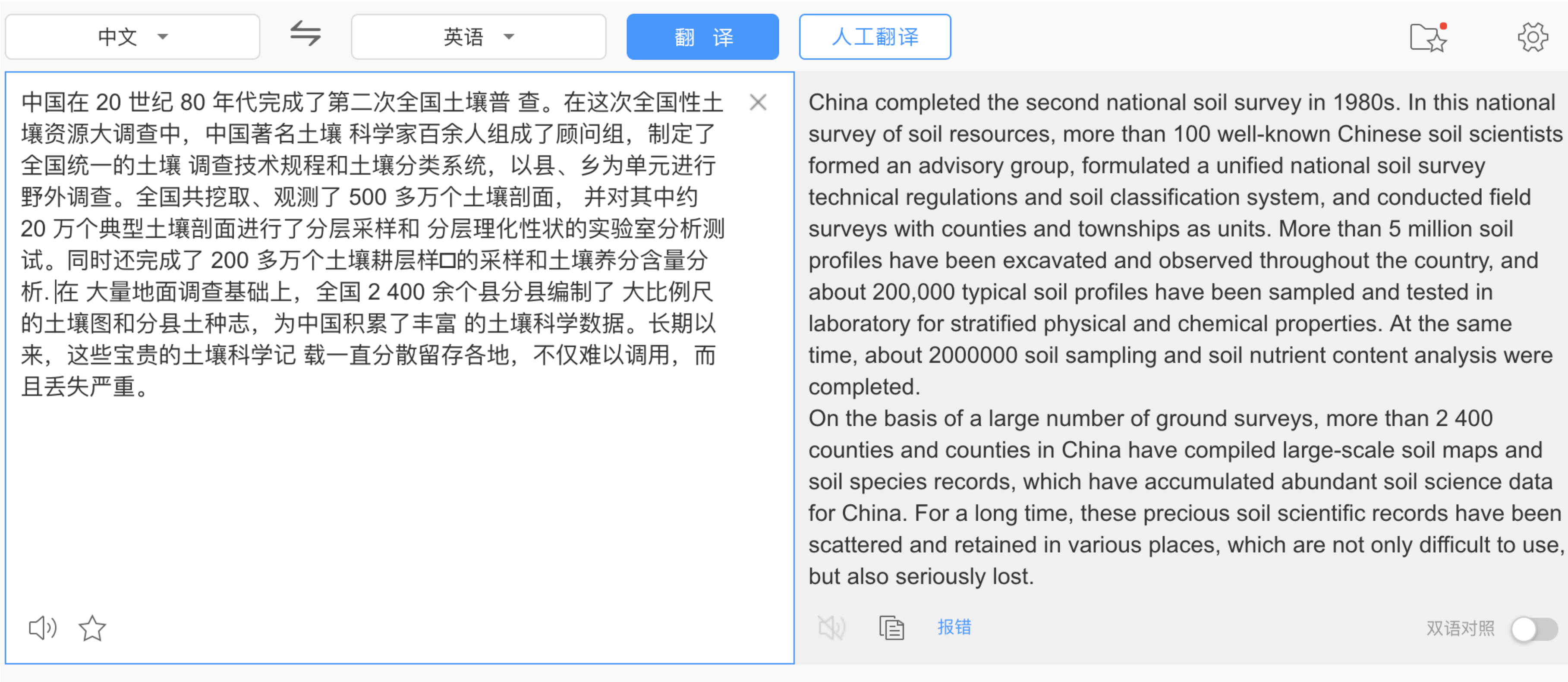
Scientific English – 3

- **Shorter** is (usually) better, but don't sacrifice length for **clarity**
- Use a **dictionary** and **style manual** when in doubt
- Use a **spelling and grammar checker**, but also:
  - Watch out for homonyms: e.g. "bear" 熊 vs. "bare" 裸露
  - Watch out for correctly-spelled word but not the intended meaning

The writing process

- Option: **write in Chinese and translate to English**
  - Problem: different language **structures** and **methods of expression**
  - **Automatic translation** is getting better, but not yet perfect
- Option: **write in English** from the start
  - You can **outline** or write **key points** in Chinese to organize your thoughts
- How to be **creative**? Two contrasting writing methods:
  - Write as *fast* as possible, correct later; or
  - Write *carefully*, don't leave any problems.
- Find the best **time of day** for writing – it is a *creative* process
- Keep an **author's notebook** with you in case you get a good idea

Automatic translation



Revising and re-writing

- All good authors **revise** and **re-write** extensively.

- Read your own work **as if you did not know it** and from the **point of view of your intended audience**.

  * Does it say what you **intended**?
  * Are all the points **clear** and **unambiguous**?
  * Is it at the **right technical level** for your intended reader?
  * Is it at the **right language level** (style, vocabulary) for your intended reader?
  * Does it strictly follow the **journal guidelines** for style, presentation, citations, figures . . . ?

- Do this **several times**. Co-authors should each do this, in turn.

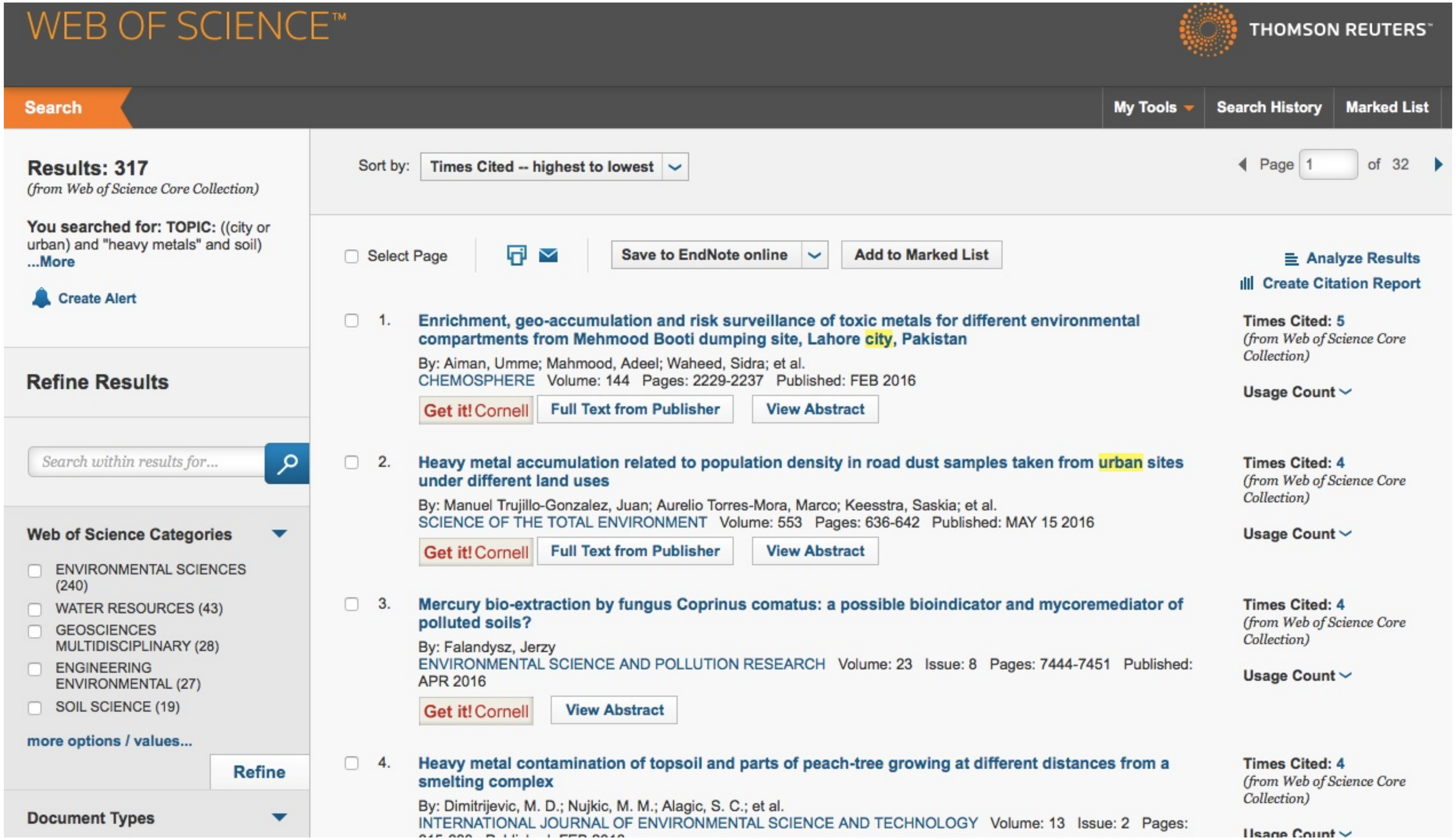
- Do not be afraid to *cut* out pieces or even do *major surgery*! Put your ego aside.

Topic: Getting your paper read and cited

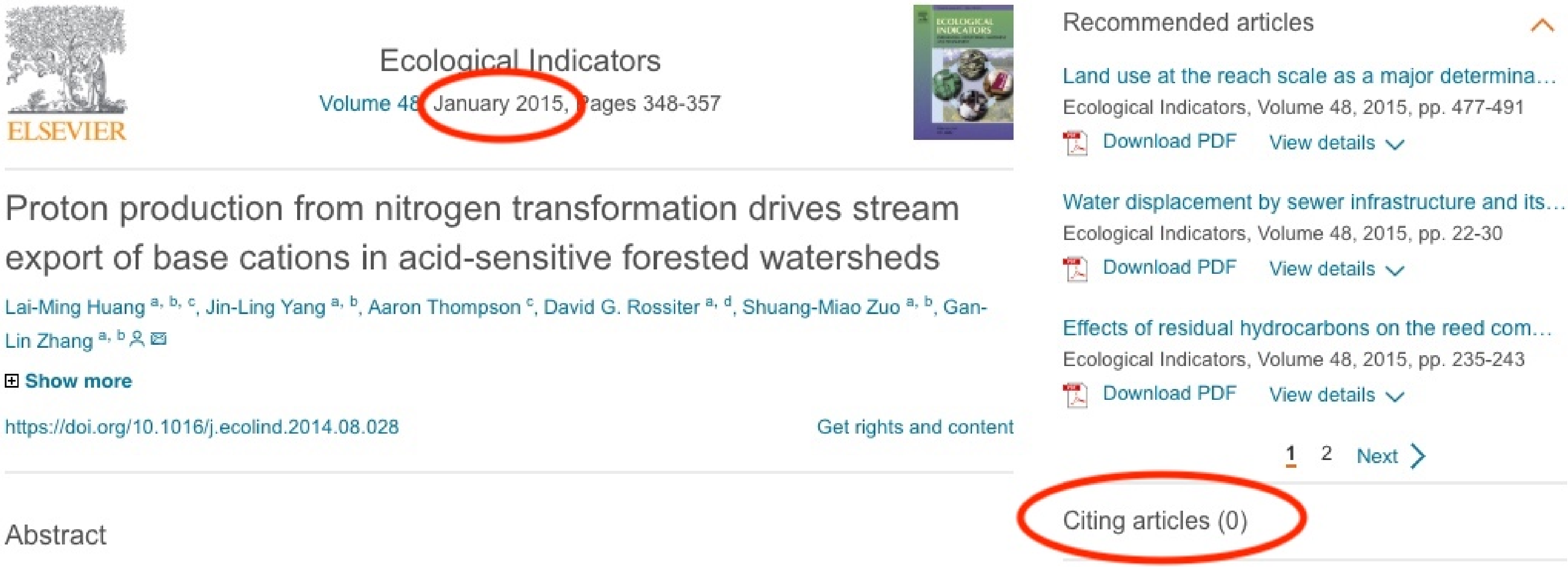
- There are an overwhelming number of papers published, even within a specialized field
- Others may find your paper with a **literature search** through Web of Science, Science Direct, [Google Scholar] . . .
- But there are so many papers, **how will they find yours**?
- And if they find it, **will they use** (cite) it?

Search results

Search: TOPIC: ((city or urban) and "heavy metals" and soil) Timespan: **2016** **317 hits!**



No citations → no impact



Citations → impact

ELSEVIER

Geoderma

Volumes 259–260, December 2015, Pages 71-80

Can citizen science assist digital soil mapping?

David G. Rossiter [a, b], Jing Liu [c], Steve Carlisle [d], A.-Xing Zhu [e, c]

Show more

https://doi.org/10.1016/j.geoderma.2015.05.006

Highlights

- Citizen science is the participation of non-specialists in scientific research.
- Citizens can contribute primary observations or note discrepancies on existing maps.
- A major issue in citizen science is stimulating citizens to participate.
- A key issue is how to integrate observations from citizens and those from professionals.

Citing articles (16)

Exploring farmers' intentions to adopt mobile Short…
2018, Computers and Electronics in Agriculture
Download PDF View details

Crowdsourcing for agricultural applications: A revi…
2017, Computers and Electronics in Agriculture
Download PDF View details

Soil data for biophysical models in Victoria, Austral…
2016, Geoderma Regional

Helping others find your paper

- **Write on an important topic, do good science, write well!**
  - Then it will be **cited** by those who find it, and then found by those who read the cited paper.
- Publish in a journal which is read by your **target audience**
  - They often get **content alerts** by e-mail and will see your article
- Have a **clear and concise abstract**
  - these are shown in **searches** and in some forms of content alerts, so many people will see this, you want to get them to read the whole paper
- **Open access**: can be read by everyone, not only those with subscriptions
  - Maybe you can get the article “under the table” but many of your potential readers can not

Conclusion

- Publishing scientific papers may be a *requirement* but the better way to look at it is as an *opportunity to contribute* to the scientific enterprise.
- Add your (little or big) piece of the puzzle / brick to the wall.
- In the long run, you want your paper to be *used*, not just listed in your CV.
- So **do good science**, **pick important topics**, and **write clear and interesting papers**!

End


尽管还难以达到百分之百的准
确，我们仍要尽百分之百的努力。
We are not perfect, but we will do our best

上海气象局

Topic: Other issues

- Active vs. passive voice verbs
- Structuring a document by outlining
- Too many authors!

Verbs: voice

Voice: **Active** and **passive**.

Active 主动语态:

'Pests damage crops.'

'Over-fertilization damages crops.'

'The experimenter damaged the crop.'

'I damaged the crop.'

Passive 被动语态:

'Crops are damaged by pests.'

'Crops are damaged in the spring.'

'The crop was damaged by the experimenter' (me!)

When to use passive voice?

When the **object** is more important than the **subject**, or if the subject is irrelevant:

‘The wheat crop was damaged in the spring.’

But the subject can be mentioned:

‘The wheat crop was damaged in the spring by over-fertilization.’

It’s implied that the farmer was responsible for over-fertilization, but maybe not:

‘The wheat crop was damaged in the spring by the excessive amounts of fertilizer applied as part of the experiment.’

When to use the active voice?

To make it clear who did what (Webster, European Journal of Soil Science 54:215):

- **assumption**: 'It is assumed that': who does?
  - 'We assume that . . . ' or 'The previous survey assumed that . . . '
- **decision**: 'It was decided to': who decided?
  - 'The authors decided to . . . ' or 'The local government authority decided to . . . '
- **choice**: 'Sites were chosen': who chose?
  - 'An experienced soil surveyor chose the sites' or 'The local extension agent directed us to cooperative farmers, who were convinced by the agent to allow use of a small portion of their fields, of the farmers' choosing'.

Avoiding egotism with the active voice

Repeated use of “I” is often jarring to the reader. Some ways to avoid:

- Use “We” if more than one author; this sounds much less egotistical
- Use “The author(s)”
- Introduce a paragraph with the active voice, write the rest in the passive:

  “**We** designed this study to avoid bias. Sites were chosen so that . . . Care was taken in sampling . . . Samples were placed immediately in a thermally-isolated container . . . ”

Structuring a document by outlining

One way to impose structure on a document is by **outlining** it before beginning to write.

Outlining:

- working from the overall structure of the document . . .
- in a **hierarchical** manner . . .
- to arrive at the specifics.

This ensures that all the **pieces** of the story will be **in place** before you have to write.

The outline shows their **inter-relation**, in particular, the **order of argumentation** (not yet the argument itself).

Example structure: the stereotypical research paper

A journal paper often follows this structure:

1. Introduction
2. Materials & Methods
3. Results
4. Discussion
5. Conclusions

These headings are at the same level of importance.

The author implies that this is the sequence in which they should be read (can't understand results without methods etc.)

Example structure (2)

Note that this is just an example to illustrate structuring; other structures are possible for a thesis (*separate lecture*).

Question: Is this the best order for these elements? Hint: look at an article in *Nature*; the main conclusions come first.

Expand one level

1. Introduction

2. Materials & Methods

2.1. Sampling design
2.2. Field methods
2.3. Data processing
2.4. Data analysis

3. . . .

Note that the order of subsections has a logic: here, the **sequence** in which the methods are carried out (design, then go to the field, then process . . .).

Notice how we ensure every method will have a place where it is best described, before we have to write anything.

Expand a second level

1. Introduction

2. Materials & Methods

 2.1. Sampling design
 2.2. Field methods
  2.2.1. Infiltration and saturated water content
  2.2.2. Soil profile description
  2.2.3. Bulk density
 2.3. Data processing
 2.4. Data analysis

3. . . .

The order of subsections here is arbitrary, there is no priority to any of the methods.

Text processor support for outlining

MS-Word “Outlining” mode; heading styles; table of contents derived from these

LaTeX sectioning macros (e.g. `\section`); table of contents derived from these (with `\tableofcontents`)

Paragraphs

Each named sections in the outline is made up of one or more **paragraphs**

These can be considered the **final level** of the outline.

A **paragraph** is a **set of sentences** that **work together** to make **one point**.

"[A] **unit of thought**, not of length; it must be **homogeneous in subject matter** and **sequential in treatment**"

— Fowler, H. W. & Gowers, E. (1965) *A dictionary of modern English usage*; Oxford: Clarendon Press

Writing paragraphs by topic sentences

Each paragraph has a narrowly-defined **topic**.

The **topic sentence** technique is often used to begin paragraphs.

The idea is to:

- write a sentence that **introduces** the topic of the paragraph, and
- leave the **details** of that paragraph for following **filling** sentences.

(Note: readers will **skim** a document exactly this way)

Example topic sentences

1. Knowledge of soil spatial variation is essential for ecological processes modeling.

   This is our main motivation; but how do we get this knowledge?

2. Numerous methods have been developed to predict soil spatial distribution based on the relationships between soil and its environmental covariates.

   list the methods and their strong/weak points

3. To deal with the spatial non-stationarity of regression coefficients between a target variable and explanatory variables, geographically weighted regression (GWR) was developed to estimate varying coefficients of explanatory variables locally . . .

   explain the details of GWR

Source: Zeng, C., Yang, L., Zhu, A.-X., Rossiter, D. G., Liu, J., Liu, J., ‘Ă‘ę Wang, D. (2016). *Mapping soil organic matter concentration at different scales using a mixed geographically weighted regression method*. **Geoderma**, 281, 69–82. https://doi.org/10.1016/j.geoderma.2016.06.033

Expansion of topic sentences into paragraphs

Topic sentence: “Knowledge of soil spatial variation is essential for ecological processes modeling.”

1. “Soil has long been considered as the result of the interaction of its formative environment, including climate, parent material, terrain, and vegetation conditions”

   this expands the concept of soil spatial variation

2. “**Therefore**, the relationships between soil and its environmental covariates can be used to map soil variations over space”

   this concludes the paragraph and points to the next. Note the connective “therefore”.

This leads naturally to the next topic sentence: “Numerous methods have been developed to predict . . . ”

Linking words and phrases

(Also called **connectives**)

This is a common way to show the **flow of ideas** within a paragraph – it emphasizes the **coherence** of the ideas.

They explicitly draw the reader's attention to the **connection** between sentences.

Example

Without connectives:

The guitar is the most common instrument in popular music.
This was not always the case.
The guitar has a long history.
Before the early part of the 20th century it was hardly used.
Popular music was accompanied by the piano.

With connectives:

The guitar is the most common instrument in popular music.
However, this was not always the case.
Although the guitar has a long history, **until** the early part of the 20th century it was hardly used.
Instead, popular music was accompanied by the piano.

Some common linking words and phrases

In addition	Also	Similarly	Further(more)
By contrast	However	Despite	Even though
Thus	In this way	Therefore	Hence
On the one hand	On the other hand	First(ly)	Second(ly)
Initially	Later	During	Finally
Because (of)	As a consequence (of)	Since	As a result
Assuming that	Presuming that	Supposing that	Consequently
With respect to	With regard to	Considering	Regarding
Fortunately	Unfortunately	By coincidence	Incidentally
Still	Nonetheless	And yet	Nevertheless
In short	In summary	In conclusion	To summarize
Surprisingly	To our surprise	As expected	Unsurprisingly

Citations

Citations to other's works are used for anything that is not the result of the author's own creative effort.

Citations form part of the text. They can either be **supporting** or **descriptive**.

supporting At the end of a sentence, clause, or word, supporting a statement just made.

- Example: "The Hungarian Environmental Monitoring System is a point-vector database containing 1236 soil profile descriptions [1]."

descriptive The reference is being discussed directly.

- Example: "The successful clustering of the profiles by principal components analysis matches the results of Gobin *et al.* [1], . . . "

Too many authors!

- Not so long ago a typical paper had one to three authors
  - graduate student, supervisor, maybe a specialist in part of the work not covered by supervisor
- The trend toward **many authors** even on a simple paper
  - Everyone in the workgroup; head of research group (even if not supervisor, not involved in research); foreign guest researchers (even if minimal involvement); colleagues at institutions that provided data or lab work . . .
  - *Important*: every author listed has to support the conclusions of the paper, the methods used, the data quality . . . either by direct knowledge or by trusting other authors In case of fraud or scientific misconduct, *all* are liable
- The **difficulty** is then to know **who did what**, and **where to give credit** – all those names **dilute** 冲淡 the credit
- One solution: present the **specific contribution to the work** of each co-author

Example contributions list

Crowther, T. W., Todd-Brown, K. E. O., Rowe, C. W., Wieder, W. R., Carey, J. C., Machmuller, M. B., . . . Bradford, M. A. (2016). Quantifying global soil carbon losses in response to warming. *Nature*, 540(7631), 104–108.

“ Contributions: The study was **conceived** by T.W.C. and N.W.S., and **developed** by T.W.C., M.A.B., K.E.O.T.-B. and W.R.W. **Statistical analysis** was performed by K.E.O.T.-B., M.A.B. and B.L.S. **Spatial scaling and mapping** were performed by W.R.W. and C.W.R. The manuscript was **written** by T.W.C. with **assistance** from C.W.R., M.A.B., W.R.W., K.E.O.T.-B., S.D.A. and P.B.R. All other authors **reviewed and provided input** on the manuscript. **Measurements** of soil C, bulk density and geospatial data from climate change experiments around the world **were provided by** J.C.C., M.B.M., S.F., G.Z., A.J.B., B.E., S.R., J.H., H.L., Y.L., A.M., J.P., M.E., S.D.F., G.K.-D., C.P., P.H.T., L.L.R., E.P., S.S., J.M.L., S.D.A., K.K.T., B.E., L.N.M., I.K.S., K.S.L., Y.C., F.A.D., S.D.B., S.M., S.N., A.T.C., J.M.B., J.S.C., J.G., B.R.J., J.M., L.P.-M. and P.B.R.”

Here they list many co-authors who only supplied data and did not work on the paper.